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(54) HAIR GROWING WATER, ITS PRODUCTION, APPARATUS FOR PRODUCING THE SAME AND TESTOSTERONE DEHYDROGENASE ACTIVITY INHIBITOR

(57)Abstract:
PROBLEM TO BE SOLVED: To produce hair growing water capable of effectively producing and rearing hair in a short period.
SOLUTION: This hair growing water comprises hot spring water having an oxidation-reduction potential regulated to ≥1,000 mV. The hot spring water preferably contains calcium, sulfur, aluminum, silicon, potassium, zirconium, iron and chloride ion, sulfate ion, etc., and may further contain sodium, magnesium, phosphorus, strontium, bromine, manganese, etc. The hot spring water is especially preferably acidic hot spring water.

CLAIMS

[Claim(s)]
[Claim 1] Hair-fostering water characterized by consisting of hot spring water which set the oxidation reduction potential to 1000mV or more.
[Claim 2] Hair-fostering water according to claim 1 characterized by basing adjustment of the above-mentioned oxidation reduction potential on a circulation anode oxidation method.
[Claim 3] the amount of potential falls from the oxidation reduction potential before mixing when carrying out this capacity addition, being in ordinary temperature, and leaving 50 millimol tris hydrochloric-acid buffer solution (pH7.5) diluted with distilled water twice for 40 minutes -- 350mV super-****** -- the hair-fostering water characterized by things.
[Claim 4] The manufacture approach of the hair-fostering water characterized by using hot spring water as a raw material, and setting the oxidation reduction potential to 1000mV or more by anodic oxidation.
[Claim 5] The manufacture approach of the hair-fostering water according to claim 4 characterized by adjusting the above-mentioned oxidation reduction potential with a circulation anode oxidation method.
[Claim 6] The manufacturing installation of the cell which has a diaphragm between an anode plate and cathode, the anode plate side treated water tub which stores anode plate side treated water, the

cathode side treated water tub which stores cathode side treated water, the mixing chamber which mixes the treated water from an anode plate side treated water tub, and the treated water from a cathode side treated water tub, and the hair-fostering water characterized by having a migration means to transport treated water from a mixing chamber to this cell.
[Claim 7] The testosterone-5alpha-hydrogenase activity inhibitor characterized by consisting of hot spring water which set the oxidation reduction potential to 1000mV or more.
[Claim 8] the amount of potential falls from the oxidation reduction potential before mixing when carrying out this capacity addition and leaving 50 millimol tris hydrochloric-acid buffer solution (pH7.5) diluted with distilled water twice for 40 minutes in ordinary temperature -- 350mV super-****** -- the testosterone-5alpha-hydrogenase activity inhibitor characterized by things.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention carries out hair growing of the hair of hair, and relates to the technique to raise.
[0002]
[Description of the Prior Art] The hair of hair was the symbol of a life more from ancient times. And the hair of the hair carried out in tufts makes the manifestation of youth imagine also in modern society. On the other hand, a psilosis and bald [so-called] tend to cause complex, and are said to have big effect even on personality.
[0003] However, although the therapy of a psilosis is difficult and many approaches have been tried regardless of scientific and a common superstition target by current, the present condition is that the solution approach which can be referred to as still decisive is not found out.
[0004]
[Problem(s) to be Solved by the Invention] This invention improves the above-mentioned conventional trouble, i.e., it is a short period of time, and hair growing of the hair of hair is carried out, and it aims simple and effective at offering the hair-fostering water to raise.
[0005]
[Means for Solving the Problem] Recently, paying attention to the testosterone which is a male sex hormone, the problem solving from this direction tackles about a psilosis. However, the balance of hormone was lost, or there were problems, such as being accompanied by the side effect, and utilization was difficult. this invention person also examined how to control this activity wholeheartedly paying attention to the activity of this testosterone-5alpha-hydrogenase, and resulted in this invention.
[0006] That is, the hair-fostering water of this invention has the configuration which consists of hot spring water which set the oxidation reduction potential to 1000mV or more a passage according to claim 1 in order to solve the above-mentioned technical problem. Moreover, for the hair-fostering water of this invention, the amount of potential falls from the oxidation reduction potential before mixing when carrying out this capacity addition, being in ordinary temperature, and leaving 50 millimol tris hydrochloric-acid buffer solution (pH7.5) diluted with distilled water twice for 40 minutes a passage according to claim 3, in order to solve the above-mentioned technical problem is 350mV super-******.
[0007]
[Embodiment of the Invention] As a raw material used by this invention, it is usually required to be hot spring water. Here, what is generally specified as hot spring water as a hot spring can be used.
[0008] As hot spring water, the thing containing calcium, sulfur, aluminum, silicon, a potassium, a

zirconium, iron and a chlorine ion, sulfate ion, etc. is desirable. In addition, sodium, magnesium, phosphorus, strontium, a bromine, manganese, etc. may be included. In addition, it is especially desirable that it is acid hot spring water.

[0009] As for such acid hot spring water, Zao Hot Spring (the store of your opinion No. 2), the Naruko hot spring (**** No. 1 Onsen Shrine sulfur mixing Izumi), a mountain hot spring (former molten bath), the Sugawa hot spring (molten bath of a waterfall), the Tamagawa hot spring (molten bath of large **), Kusatsu Hot Spring (****), Beppu Hot Spring (guardian deity of children Izumi), Noboribetsu Hot Spring (No. 1 ****), etc. are mentioned.

[0010] In addition, hot spring water other than acidity, for example, a **** hot spring, (association No. 2), the Okaya hot spring (Okaya, Nagano), A lofty peak hot spring (Chiisagata, Nagano County), a molten-bath Hiraatsu spring (Oita Kusu group), the Mt. Asakusa hot spring (Mt. Asakusa hot spring 2nd), and now in hot spring water, such as a God hot spring and Gero Hot Spring (Onsen-ji pump place) It may be difficult to obtain a desired oxidation reduction potential, and it can use it suitably by carrying out mixed use with the acid above-mentioned hot spring water then.

[0011] since it may become a failure in case an oxidation reduction potential is adjusted, when the dissolved carbon dioxide is included in these hot spring water, it is desirable to use, since the so-called bubbling which blows nitrogen or air before the adjustment is performed enough.

[0012] Here, although it is unknown for details, the hot spring water which is the main raw material of the hair-fostering water of this invention is dissolving many compounds and ion, and has the cluster size of a natural water no one but. Since it has the specific oxidation reduction potential using such a raw material, the hair-fostering water of this invention is imagined to be that from which the activity of testosterone-5alpha-hydrogenase leading to a psilosis is controlled, consequently epoch-making effectiveness peculiar to this invention is acquired in the short term.

[0013] In addition, although hot spring water itself may be used as a raw material in the hair-fostering water of this invention, in order to adjust to the conductivity suitable for electrolysis, water with little various ion, such as distilled water and ion exchange water, for example, the purified water of a Japanese pharmacopoeia, tap water, etc. may be added suitably.

[0014] The value measured by general approaches, such as the approach of converting into normal-hydrogen-electrode potential using a platinum electrode and a calomel electrode, is used for the oxidation reduction potential in this invention. In addition, you may measure using a commercial oxidation-reduction-potential meter etc.

[0015] In addition, in the hair-fostering water of this invention, an oxidation reduction potential needs to be 1000mV or more. Sufficient effectiveness is not acquired as it is 1000mV or less. In addition, the effectiveness pH excelled [effectiveness] in coincidence 2.4 or less especially when the sum of residual chlorine concentration and hypochlorous-acid concentration was set to 5 ppm or more is acquired.

[0016] Moreover, for the hair-fostering water of this invention, the amount of potential falls (henceforth "the amount of falls of the oxidation reduction potential for 40 minutes") from the oxidation reduction potential before mixing when carrying out this capacity addition, being in ordinary temperature, and leaving 50 millimol tris hydrochloric-acid buffer solution (pH7.5) diluted with distilled water twice for 40 minutes is 350mV super-******. Although a thing 1000mV or more also has an oxidation reduction potential also in commercial strong acidity water, the amount of falls of the oxidation reduction potential for [above-mentioned] 40 minutes of them all is 300mV or less, and the effectiveness of this invention is not acquired with the strong acidity water of such marketing. In addition, also as follows, the relation between the amount of falls of the oxidation reduction potential for 40 minutes and the effectiveness of the invention in this application is considered, for example.

[0017] That is, the hair-fostering water with which an oxidation reduction potential falls promptly

in the buffer solution has a kind of activation force equivalent to the potential which decreases. And this activation force works on the organ which manages hair growing and hair fostering of the head skin, a hair root, etc., and is considered to promote hair growing and hair fostering, and it is surmised that influence in the above-mentioned organ of the energy at this time needs to be intensive in a short time. This is [0018] supported also from the effectiveness of this invention not being acquired with the strong acidity water of marketing with few amounts of falls of the oxidation reduction potential for 40 minutes, either, even if an oxidation reduction potential is high. In this invention, adjustment of an oxidation reduction potential can be performed using a cell. That is, it can carry out by electrolyzing using a diaphragm if needed on an anode plate, cathode, and the structure of a cell. In addition, an anode plate and cathode need to consist of the quality of the material which has sufficient resistance. The titanium which coated platinum as such the quality of the material can be mentioned.

[0019] In addition, as for adjustment of the oxidation reduction potential in this invention, being based on a circulation anode oxidation method is desirable. A circulation anode oxidation method is the approach of mixing the whole quantity of the treated water (anode plate side treated water) processed by the anode plate side of a cell, and the whole quantity of the treated water (cathode side treated water) processed by the cathode side, supplying this to a cell as raw water, performing electrolysis processing, and repeating this here. In addition, although there is especially no assignment as a mixed ratio of anode plate side treated water and cathode side treated water, they are usually the 1:1 neighborhoods.

[0020] It is desirable to use as it is in use of the hair-fostering water of this invention. The effectiveness of this invention may decrease remarkably or the effectiveness itself may not no longer be acquired by unprepared dilution or addition of the third component. Therefore, to mix with the component of others, such as dilution by distilled water, ion exchange water, tap water, etc. or other hair-fostering components, and a hairdressing component, and use, it is required to check that there is no fall of effectiveness beforehand.

[0021] The hair-fostering water of this invention can promote hair growing and hair fostering by supplying a required part by approaches, such as a spray and spreading. At this time, it is desirable to use periodically with 1 etc. time etc. on the 1st at 1 time thru/or several times or several days thru/or one week. In addition, it is usually use of a bis die and effectiveness can be demonstrated effectively and quickly. Namely, it becomes a psilosis and the Mashike effectiveness can check now objective by the use for two weeks - two months about the part for less than about ten years. Moreover, hair growing and hair fostering also of the part which became a psilosis and passed for about ten years or more are done one by one by continuation of use for about three - six months. in addition, the part which was canities changes to black hair gradually -- secondary -- degree effectiveness is acquired in many cases.

[0022] It is maintained when hair growing and the restored part continue use of hair-fostering water also after that by use of the hair-fostering water of this invention. The amount of the hair-fostering water used in this case and operating frequency may be suitably lessened as compared with the time of hair growing and hair fostering. In addition, as for the above-mentioned hair-fostering water, it is desirable to put into the container which covers ultraviolet rays and to save in a cool place.

[0023]

[Example] The hair-fostering water of this invention is explained concretely below. In addition, this invention is not limited to the following examples.

[0024] It is the model Fig. showing the example of the equipment for manufacturing the hair-fostering water of this invention to [manufacturing installation] drawing 1 . The sign 1 in drawing 1 is attached and the aerator is shown. Hot spring water (raw water) is blown in air with this aerator 1 (about 28 l/min), and a dissolved carbon dioxide is removed. The raw water from which the unnecessary carbon dioxide was removed with the aerator is moved from the upper part to the pump

tub 3 with a pump 2.
[0025] In addition, in this example, when the conductivity of raw water exceeds 9000microS/cm, Japanese pharmacopoeia purified water is added, and it is carrying out to below 9000microS/cm.
[0026] This water is introduced into a cell 5 with a pump 4 from the lower part of the pump tub 3. There are the anode plate and cathode which become a cell 5 from the titanium with which platinum plating was performed, the diaphragm is allotted among these electrodes, and mixing with the treated water (anode plate side treated water) by which electrolysis processing was carried out near the anode plate, and the treated water (cathode side treated water) by which electrolysis processing was carried out near cathode is prevented.
[0027] Anode plate side treated water is introduced from a cell 5 in the anode plate side treated water tub 6 lower part, and fills this anode plate side treated water tub 6, and excessive treated water is further introduced from the anode plate side treated water tub 6 upper part to a mixing chamber 7. On the other hand, cathode side treated water is introduced from a cell 5 in the cathode side treated water tub 8 lower part, and fills this anode plate side treated water tub 6, and excessive treated water is further introduced from the cathode side treated water tub 8 upper part to a mixing chamber 7. In addition, the treated water as a product is extracted from the anode plate side treated water tub 6 lower part.
[0028] After being mixed by the mixolimnion, pump migration is again carried out through the pump tub 3 to a cell 5 from the upper part and the lower part, and the cyclic use of waste water of the electrolysis processing is again performed and carried out to these anode plate side treated water and cathode side treated water.
[0029] in addition, this example -- setting -- each of the pump tub 3 and a mixing chamber 7 -- capacity is the same (10l.), and it is the one half of each capacity (20l.) of the anode plate side treated water tub 6 and the cathode side treated water tub 8, and the capacity of an aerator 1 is 40l. In addition, the cell 5 is very compact and its capacity in the capacity of a cell 5, each passage, and a pump is small enough compared with each above-mentioned container.
[0030] Moreover, when this equipment was actually operated, precipitate might be accumulated in cathode side treated water tub 8 pars basilaris ossis occipitalis, but since migration of the treated water from this tank to a mixing chamber is performed from the tank upper part, the failure by precipitate is not generated at all.
[0031] In the example shown below in [circulation anodizing], circulation anodizing equipment like drawing 1 was used as a manufacturing installation of the hair-fostering water concerning this invention. In addition, raw water (hot spring water) performed all the following processings at the room temperature, using what became a room temperature.
[0032] The flow rate of a pump 4 was set as 3 l/min. This flow rate is about 1 of capacity of circulation part of equipment/20, and the water of a circulation part is calculable in electrolysis processing of 1 cycle having been performed by the processing for 20 minutes.
[0033] The range of the electrical potential difference impressed to inter-electrode [of a cell] is usually not more than more than 4V30V, and it is usually set up so that an oxidation reduction potential may be set to 1000mV or more by processing of 6 cycle extent by the electrolysis processing conversion by the above.
[0034] Circulation anodizing was performed after performing aeration processing with the air for 30 minutes by using the molten bath (fluorine-containing arsenic boric acid acidity alum green vitriol Izumi) of [production of treated water A] Akita Tamagawa, Tazawakomachi hot spring large ** as raw water. The oxidation reduction potential of the treated water (following "treated water A") as an obtained product is 1180mV, and, as for pH, the sum of 1.80, hypochlorite concentration, and hypochlorous-acid concentration was set to 54 ppm. The amount of falls of the oxidation reduction potential for [of this treated water A] 40 minutes was 359mV.
[0035] Treated water B as well as treated water A was obtained using the molten bath (862-1, ****,

Zao Hot Spring, Yamagata-shi, Yamagata-ken, acidity, a sulfur-containing-aluminum-sulfate and a chloride hot spring (the old nature-of-the-water-of-a-hot-spring name: sulfur-containing ****** strong acid nature alum Izumi)) of the source of [production of treated water B] Zao Hot Spring 7 outdoors. The oxidation reduction potential of this thing is 1140mV, and the sum of 2.1, hypochlorite concentration, and hypochlorous-acid concentration was set to 30 ppm by pH. Moreover, the amount of falls of the oxidation reduction potential for [of treated water B] 40 minutes was 342mV.

[0036] Treated water C as well as treated water A was obtained using the fountainhead water (the store of your opinion No. 2, acidity and a ferruginous-sulfur-aluminum-sulfate spring) of [production of treated water C] Zao Hot Spring. The oxidation reduction potential of this thing is 1205mV, and the sum of 1.68, hypochlorite concentration, and hypochlorous-acid concentration was set to 54 ppm by pH. Moreover, the amount of falls of the oxidation reduction potential for [of treated water C] 40 minutes was 394mV.

[0037] Treated water C as well as treated water A was obtained using the fountainhead water (the molten bath in Otaki, acid sulfur spring) of [production of treated water D] Kusatsu Hot Spring. The oxidation reduction potential of this thing is 1115mV, and the sum of 2.4, hypochlorite concentration, and hypochlorous-acid concentration was set to 21 ppm by pH. Moreover, the amount of falls of the oxidation reduction potential for [of treated water D] 40 minutes was 341mV.

[0038] Effect investigation to [testosterone-5alpha-hydrogenase activity The 1] testosterone (henceforth "TS") is returned to a 5alpha-dihydrotestosterone (henceforth "5alphaDHT") by the testosterone-5alpha-hydrogenase under organization ("T5alphaH" is said testosterone-5alpha-reductase and the following).

[0039] In the following examination, the effect of treated water A-C exerted on T5alphaH activity by using Homo sapiens liver cytosol (they being acquisition and -80-degree-C preservation article from KE, Inc. A C) and a rat prostate gland (the prostate gland of SD system male rat (it receives from 7 weeks old and Japan CHARUSU liver incorporated company) being used immediately after adjustment) as an enzyme ingredient was investigated. [0040] which shows a trial item in Table 1

[Table 1]

試験項目	被検物質	基質	酵素材料	試料数
阻害試験	処理水A、処理水B及び処理水C（3種、各1濃度）（陰性対象）	^{14}C－TS（1濃度）	ヒト肝サイトゾル及びラット前立腺（2種）	24

[0041] that where all saved the [4-14C] testosterone (the product made from American Radiolabled Chemicals Inc, specific radioactivity 2.12 GBq/mmol, 98.7% of radiation scientific purity), and beta-nicotinamide adenine nucleotide reduction type (Oriental Yeast make called "NADH" below) at -20 degrees C as a used reagent -- moreover, other reagents used reagent chemicals.

[0042] The inhibition trial was performed as follows. The Homo sapiens liver cytosol adjusted with 50 millimol tris hydrochloric-acid buffer solution (pH7.5, last concentration 50 mmol/l) (the 5 mgprotein/ml last concentration), Or a rat prostate gland homogenate (adjustment [add the buffer solution of tales doses under ice-cooling, and] with a micro homogenizer) In the last concentration of 250mg/ml, NADH (last concentration 1 mmol/l), Either [4-14C] TS (last concentration mol/l of 2micro) and distilled water (negative control) or treated water A-C (the last two fold serial dilution) is added, and it is an incubation (Homo-sapiens liver cytosol: for 120 minutes) at 37 degrees C. Rat prostate-gland homogenate: After carrying out for 30 minutes, the ice-cooling ethanol of 2 double

capacity was added, and the reaction was stopped.
[0043] After carrying out the spot of the supernatant liquid to the TLC plate (the product made from Silica gel 60 F254 Merck is used) and developing with dichloromethane/acetone (4:1), the quantum of the activity distribution on a TLC plate was carried out with the biotechnology imaging analyzer (Fuji Photo Film make).
[0044] At this time, metabolic turnover initial velocity multiplied the percentage reduction (Kmet) of a substrate by initial substrate concentration, and showed it with the value per cytosol protein or organization weight, and as compared with the initial velocity of a negative control, the existence of inhibition by the subject solution depended each initial velocity on the t test, and judged it. (Refer to formula I-III) . However, as for the inside Co of these formulas, initial substrate concentration and Ct show the substrate concentration of t-minute after, and t shows reaction time (min), respectively.
[0045]
[Equation 1]
Percentage reduction (Kmet)=(ln (Co/Ct))/t of a substrate .... (I)
[0046]
[Equation 2]
Metabolic turnover initial velocity =KmetxCo/(protein or organization concentration) .... (II)
[0047]
[Equation 3]
The rate of inhibition (%)
= Metabolic turnover initial velocity (contrast)-metabolic turnover initial velocity (subject solution) / metabolic turnover initial velocity (contrast) x100 .... (III)
[0048] As a result of these trials, the effect of treated water A-C exerted on the T5alphaH activity of the obtained Homo sapiens liver and a rat prostate gland is shown in Table 2 and 3, respectively, and one example of a TLC auto radio RUMIO graph is shown in drawing 2 .
[0049]
[Table 2]

被験溶液	希釈率 (倍)	初速度 (pmol / mg protein / min)	Mean ± S.D.
陰性対照 (蒸留水)	—	0.23 0.24 0.28	0.25 ± 0.03
処理水 A (pH 1.80)	2	0.09 0.04 0.07	0.07 ± 0.03
処理水 B (pH 1.84)	2	0.08 0.12 0.11	0.10 ± 0.02
処理水 C (pH 1.68)	2	0.03 0.02 0.02	0.02 ± 0.01

[0050]
[Table 3]

被験溶液	希釈率 (倍)	初速度 (pmol / g tissue / min)	Mean ± S.D.	有意差 (p)	阻害率 (%)
陰性対照 (蒸留水)	—	43.20 46.16 49.20	46.19 ± 3.00	—	—
処理水 A (pH 1.80)	2	24.40 22.80 24.40	23.87 ± 0.92	0.01	48.3
処理水 B (pH 1.84)	2	29.52 31.44 34.56	31.84 ± 2.54	0.01	31.1
処理水 C (pH 1.68)	2	2.00 2.24 0.24	1.49 ± 1.09	0.01	96.8

[0051] As for these, respectively treated water A, B, and C reaches 60% 72%, and checks the T5alphaH activity of Homo sapiens liver 92%, and the T5alphaH activity of a rat prostate gland shows 48%, 31%, and having prevented 97%, respectively.
[0052] [-- effect investigation [ ] to testosterone-5alpha-hydrogenase activity -- the 2] -- respectively -- treated water A -- It is treated water HSSAW-1 (an oxidation reduction potential 1205mV) like B and C. The amount of falls of the oxidation reduction potential for 40 minutes 394mV, pH:1.41, HSSAW-2 (for an oxidation reduction potential, 1182mV and the amount of falls of the oxidation reduction potential for 40 minutes are 359mV and pH:1.14) and HSSAW-3 (for an oxidation reduction potential, 1194mV and the amount of falls of the oxidation reduction potential for 40 minutes are 385mV and pH:1.26) were obtained.
[0053] Electrolysis processing which Zao Hot Spring (the store of your opinion No. 2) besides these treated water is used [processing], and it does not circulate [processing], using the equipment shown in drawing 1 , but passes ****** once was performed, and anode plate side treated water was obtained (it is said the following and "it is usually electrolysis water"). The oxidation reduction potential of this thing was [318mV and pH of 1109mV and the amount of falls of the oxidation reduction potential for 40 minutes] 1.65.
[0054] Furthermore, hot spring water of the molten bath of the Akita Tamagawa, Tazawakomachi hot spring large [besides these electrolysis water] ** (it is called "hot spring raw water".) For an oxidation reduction potential, 446mV and the amount of falls of the oxidation reduction potential for 40 minutes are 9mV, pH1.14, and strong acidity water (trade name "Qwest, Sun,".) of further marketing. Hot spring water is not used as a raw material, and, for 1146mV and the amount of falls of the oxidation reduction potential for 40 minutes, an oxidation reduction potential is 290mV, pH2.96, the solution of hydrochloric acid (what added the hydrochloric acid to distilled water and prepared pH to 1.89), and distilled water (it is called a "negative control".). The rate of inhibition of the T5alphaH activity of a rat prostate gland was investigated like the above using pH5.63. One example of a TLC auto radio RUMIO graph is shown for a result in Table 3 at drawing 3 .
[0055]
[Table 4]

被検検体	希釈率（蒸留水による）	阻害率（%）
陰性対照	−	−
ＨＳＳＡＷ−１	2	９５．２
ＨＳＳＡＷ−２	2	９０．３
ＨＳＳＡＷ−３	2	９３．６
通常電解水	2	４８．５
温泉原水	2	８０．８
塩酸溶液	2	７７．６
市販強酸性水	2	５１．１

[0056] The solution of hydrochloric acid to which, as for the testosterone-5alpha-hydrogenase activity depressor effect of the hair-fostering water of 350mV super-****** this invention, the amount of potential falls from the oxidation reduction potential before mixing when carrying out this capacity addition, being in ordinary temperature, and leaving 50 millimol tris hydrochloric-acid buffer solution (pH7.5) diluted with distilled water twice from the above-mentioned result for 40 minutes prepared hot spring raw water and pH to the same extent, or commercial strong acidity water shows that it is high.

[0057] In addition, although the testosterone-5alpha-hydrogenase activity depressor effect of the hair-fostering water of this invention in Table 4 shows the value higher than the result in Table 3, it is surmised that this is the difference arising from having carried out short storage and having used promptly for the cool place after hair-fostering water production after that what was saved comparatively for a long period of time by the latter to having used as a specimen at the room temperature after hair-fostering water production at the former.

[0058] Examination of [hair growing and the hair-fostering effectiveness: An example and the testosterone-5alpha-hydrogenase activity depressor effect of the hair-fostering water poured on this invention by the 1] above-mentioned examination were investigated about the actual hair growing and hair-fostering effectiveness, although checked.

[0059] Treated water A-D created above was used for the test subject who worries about a psilosis. It examined by carrying out the spray of about 40ml to the bis die of the morning and evening, and the depilation section, respectively. The result is shown how.

[0060] Before use: (alpha:47 years old of test subjects, male) The circular hairloss area with a diameter of about 10cm was near the top of the head, and natural complexion was in the condition which is almost transparent and is in sight. It is extent to which about 1cm hair thin short again has grown in this part, and the frame had come off in the shuttle-race-back mold.

[0061] When use of treated water A was started from June 6, 97, on the whole, it becomes black after two weeks, and the impression referred to as that natural complexion stopped being able to be visible easily comes out, and it came to sense a "beam" for the whole hair of hair. One month after the hair of the hair of a hairloss area becomes thick clearly, it comes to have elasticity, and the die length of the hair of this part is also 1.5cm super-******** further. It was checked that much about 5mm small hair has furthermore grown in the boundary of the depilation section of the frame upper part and a pilose area. 50 days after the beginning of using, "hair grows also in a family and it came to be called seed."

[0062] In addition, it was checked as three hair had grown depending on 2 from almost all pores, and the case, when it observed again 50 days after, although it was observed as the hair of one hair had grown, respectively from the part which looks like [when the hairloss area near the top of the head is observed by the fiberscope (magnifier) before the beginning of using] one pore.

[0063] No failures (the itching, exanthema, etc.) have also produced the use for the 50 above-mentioned days, and a test subject alpha will perform the trial of further the long period of time in his hope.
[0064] Before use: (beta:41 years old of test subjects, male) In order to make it hard to be the hair of the hair of the whole head is thin, therefore visible in natural complexion, the so-called Parma was applied. However, the effectiveness also decreases over several years and natural complexion can be seen.
[0065] Use of treated water B was started from May 10, 97. When hair was pushed aside with the finger along with natural complexion and it went from the direction of a frame one month after, it came to sense conventionally existence of the hair of the short hair which was not. In addition, although the birthmark was ahead of a test subject's beta head, "Whether the birthmark stopped being able to be visible easily" was said in the favorite barber these days.
[0066] In addition, also in a test subject beta, hair growing (Mashike) is checked by fiberscope observation, and any failure is not produced, either.
[0067] Before use: (gamma:53 years old of test subjects, male) The crowning of 32 years-old grade to the head became thin, when turning 45 years old, hair was almost lost, it is in the condition that thin short hair like downy hair remains slightly, and this was checked also by the fiberscope. In addition, although many available hair restorers had been tried, the effectiveness of being able to be aware of the either was not acquired.
[0068] Use of the treated water C which is hair-fostering water poured on this invention from June 15, 97 was started. When the spray was performed the morning and evening, after one week, presence appears in the downy hair of a hairloss area, and "elasticity" came to be sensed. The downy hair becomes black gradually, and "a feeling of high density" came to be sensed as use was continued after that. Two months after the beginning of using, "Whether it returned at the time in the second half of 30 years-old cost" came to be said to house people. In addition, there are not displeasure by use and sense of incongruity, and they wish further long-term use.
[0069] Before use: (delta:47 years old of test subjects, woman) The second half of the 30th generation to the parietal region becomes thin, and natural complexion can be seen from 42 years-old time. a joke -- beguiling -- coming out -- although it was, it was like [which has use of a "partial wig" recommended by the family]. In addition, when observation by 50 times by the fiberscope was performed before the beginning of using of the treated water concerning this invention in the beauty shop, in the parietal region, it was checked from the part which looks like pore that hair has grown at a time, respectively only in one.
[0070] From March 12, 97, it started and the spray of the use of treated water C was carried out the morning and evening. Two months after, it can realize now that how whose natural complexion in the parietal region is visible decreased. When expansion observation of the parietal region was performed in the same beauty shop as the above, there was also a part in which two hair has grown in most parts which look like pore, and three have grown although it is rare.
[0071] Hair increases, so that a family is also impressed the "way", and use is continued in three months after the beginning of using, also expecting it not to be a dream to return to the condition at the time of 20 years-old cost in the future. In addition, unpleasant symptoms, such as itching and sense of incongruity, are not produced at all.
[0072] Before use: (epsilon:27 years old of test subjects, male) Although the father's hair of hair was thin, he has not cherished anxiety in the hair of his own hair at all. However, in case it is a shampoo, there is fallen hair to the extent that the perforated plate of the gutter of a bathroom disappears, and it has been dazed in the autumn of 25 years old. Furthermore, at that time, there was fallen hair, so that the bolster learned the illusion whether it became deep-black with the hair of hair at every rising.
[0073] In spite of not being the age when anxiety is originally memorized, although the commercial

hair restorer was tried randomly, it is not improved at all, but fallen hair advances further, and is pointed out and teased for every friend who meets.
[0074] Use of the treated water D which is hair-fostering water was started from October 16, 1997. The fallen hair which was the amount which covers a perforated plate till then at the time of a shampoo was almost lost on the 17th day of the beginning of using. The effectiveness of treated water was not believed at the beginning, but because the season with much fallen hair finished was thought.
[0075] Although it was observed that one thick, respectively black hair has grown in the part which looks like the pore of a part with the thin hair of hair when expansion observation by the fiberscope was performed in the barber shop at the coincidence term, it was checked that small downy hair has grown in the side.
[0076] After continuing use for further one month, expansion observation by the fiberscope was performed again. then, - respectively thick from the part which looks like the above-mentioned pore -- it was checked that every three of every two black hair have grown depending on a location. In addition, that it is pointed out that the hair of hair is thin disappeared from this time. Use of treated water D is continued by considering this as encouragement, and saying, "The hair of hair is thin" can seem to be other people's affairs now around December.
[0077] Then, from these days, the use count also made the amount of the treated water D used 1 time (only night) per day again at about 15ml of days, and it has resulted after that late in September, 1998. In addition, generally sensing the mental heavy burden and the inferiority about the hair of hair in everyday life further was completely lost, without especially fallen hair increasing in spite of a season with much fallen hair in autumn. In addition, a subjective sign and inconvenient ** by which this treated water D is considered to be the cause do not have once, either, until they result after the beginning of using late in September, 1998.
[0078] Before use: (zeta:36 years old of test subjects, male) Since young time, it is the hair commonly called "****" and the thing with the thin hair of the head had not been applied to mind, either. However, a daughter (6 years old) is asked "father and a thing with the hair of hair so thin [why]", and it came to be suddenly worrisome one day.
[0079] He has noticed that started use of treated water D and fallen hair decreased after one week from April 15, 1998. A feeling of volume came out 40 days after the beginning of using, and a feel in which the hair of hair is raised with the "fur" was got. It became, so that the wife was also impressed four months after, and it was pleased also with the daughter and was able to be given.
[0080] Examination of [hair fostering and the hair-growing effectiveness: Example of comparison]
[0081] Like [production of treated water E] treated water A, the number of cycles of circulation anodizing was lessened, an oxidation reduction potential is 920mV and pH obtained the treated water E with which the sum of 2.1, hypochlorite concentration, and hypochlorous-acid concentration was set to 21 ppm. The amount of falls of the oxidation reduction potential for [of this treated water F] 40 minutes was 319mV.
[0082] Moreover, some salt was added to the Kawagoe tap water instead of hot spring water, electrolysis processing was performed to this, and anode plate side treated water was obtained (treated water F). The oxidation reduction potential of this thing was 1080mV, and the sum of pH of 2.9, hypochlorite concentration, and hypochlorous-acid concentration was 15 ppm. The amount of falls of the oxidation reduction potential for [of this treated water F] 40 minutes was 280mV.
[0083] Furthermore, the Kawagoe tap water was used as it was instead of hot spring water, and deed treated water G was obtained for circulation anodizing like treated water A except it. The oxidation reduction potential at this time was 1130mV. The amount of falls of the oxidation reduction potential for [of this treated water G] 40 minutes was 260mV.
[0084] It performed the equipment monitor test each several man and woman (40 years-old cost - 50 years-old cost) at a time whose hair of hair decreased like treated water A-D using these treated

water E-G. However, hair growing and the hair-fostering effectiveness which is accepted objective or subjectively [in any case] also in the phase of test initiation 3 previous month were not acquired.
[0085] Furthermore, although the equipment monitor test was similarly performed about commercial strong acidity water (hot spring water is not used as a raw material, and an oxidation reduction potential is 290mV and pH2.96 for 1146mV and the amount of falls of the oxidation reduction potential for 40 minutes), hair growing and the hair-fostering effectiveness which is accepted objective or subjectively also in the phase of test initiation 3 previous month were not acquired.
[0086] Examination of [hair growing and the hair-fostering effectiveness: An example, 63 test subjects with the another 2] above (those whom all acknowledge thin hair and expect the improvement.) 56 men and seven women investigated about the improvement factor at the time of using continuously treated water B' produced like treated water B for six months.
[0087] Consequently, the hair of the hair of the part in which only short hair grew before the beginning of using has been extended. The test subject by whom new hair came to be looked at in a part without the hair of hair and who realized the extensive improvement of the hair of the hair of the thin part having increased 31 persons, There were 12 test subjects the test subject who realized a certain improvement of the amount of the fallen hair which sensed Hari, chewiness, etc. for the hair of hair, and to which the hair of hair is becoming thick having decreased answered that 20 persons and change were not sensed.
[0088] Among these, when the head enlargement by the fiberscope was taken about the test subject who answered that change was not sensed and having been compared with the same photograph before the treated water B' beginning of using, the improvement of that the hair of hair becomes thick, a consistency becoming high was found by six persons among these 12 persons.
[0089]
[Effect of the Invention] The hair-fostering water of this invention is outstanding hair-fostering water which hair growing and the hair-fostering effectiveness of having excelled for a short period of time extremely discover and which should also just be called good news. That is, since effectiveness is realizable for a short period of time of several weeks - one month, it is hair-fostering water whose positive hair growing and hair fostering the hope to further hair growing and hair fostering and encouragement are obtained, consequently are finally attained.

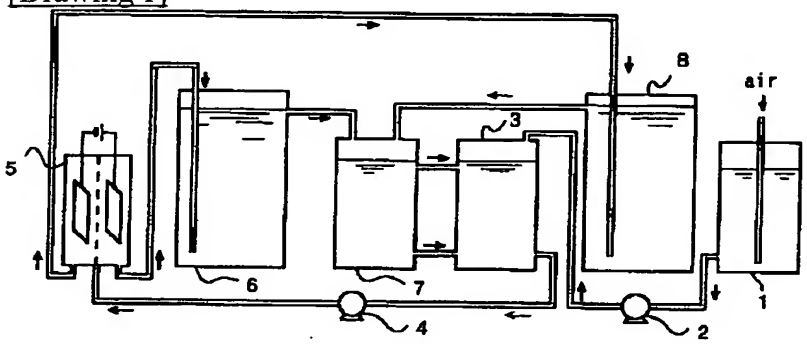
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the model Fig. showing the example of the equipment for manufacturing the hair-fostering water of this invention.
[Drawing 2] It is the example of the TLC auto radio RUMIO graph which shows the testosterone-5alpha-hydrogenase activity depressor effect of the hair-fostering water of this invention.
[Drawing 3] They are other examples of the TLC auto radio RUMIO graph which shows the testosterone-5alpha-hydrogenase activity depressor effect of the hair-fostering water of this invention.
[Description of Notations]
1 Aerator
2 Pump
3 Pump Tub
4 Pump
5 Cell
6 Anode Plate Side Treated Water Tub

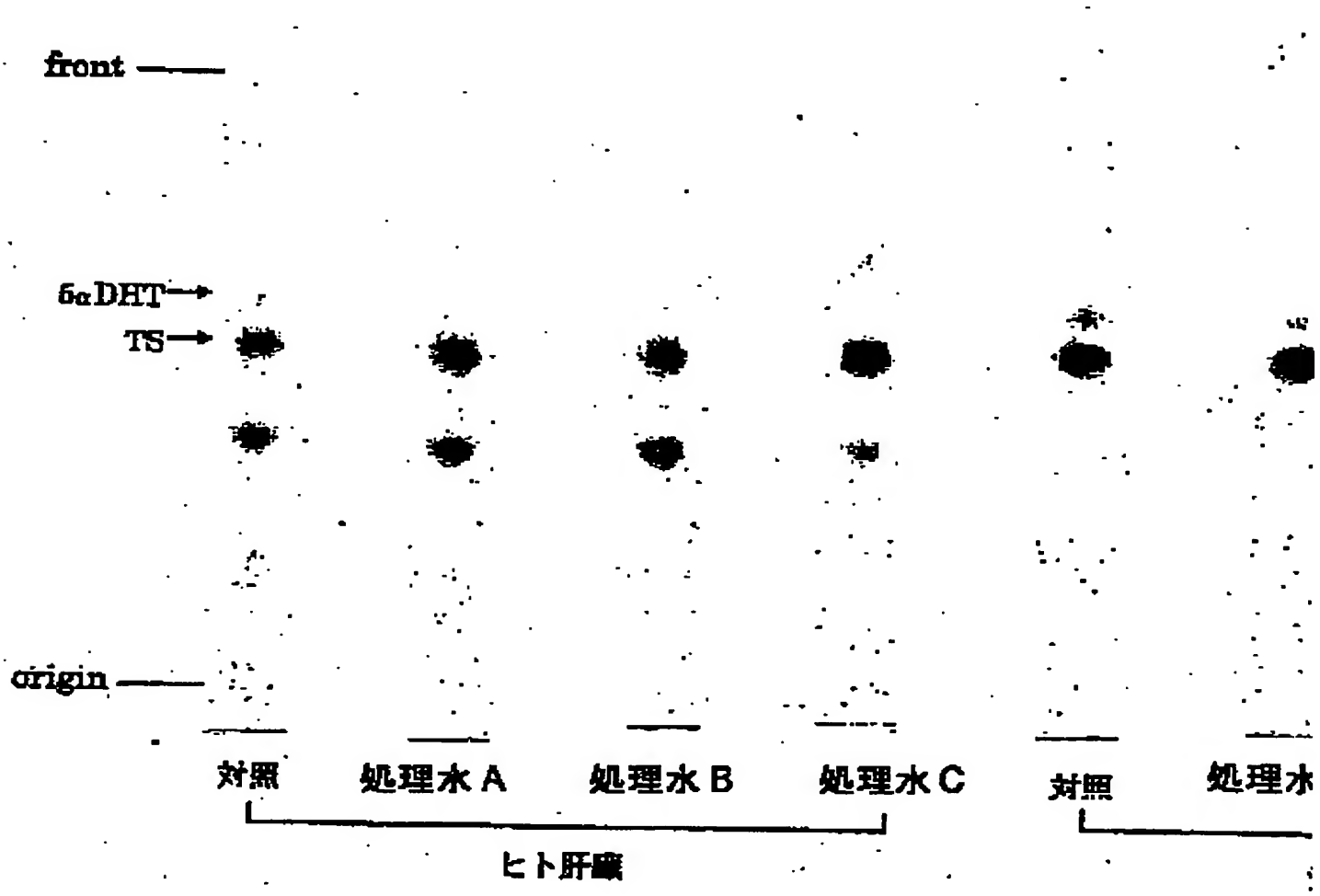
7 Mixing Chamber
8 Cathode Side Treated Water Tub

DRAWINGS

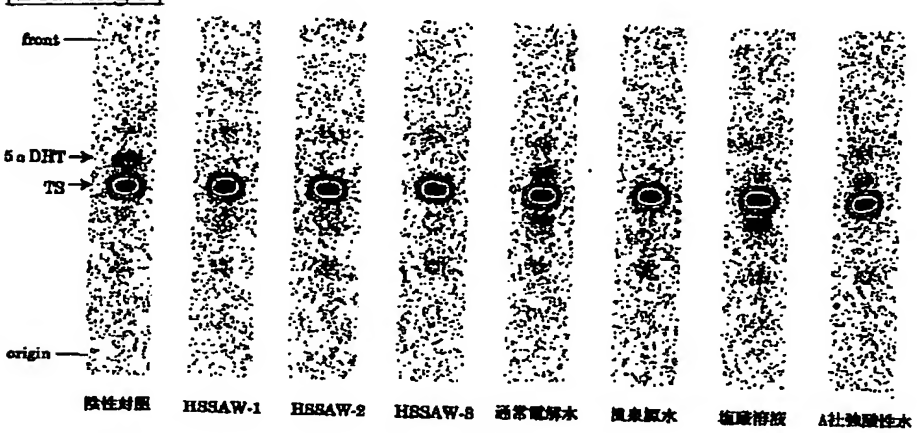
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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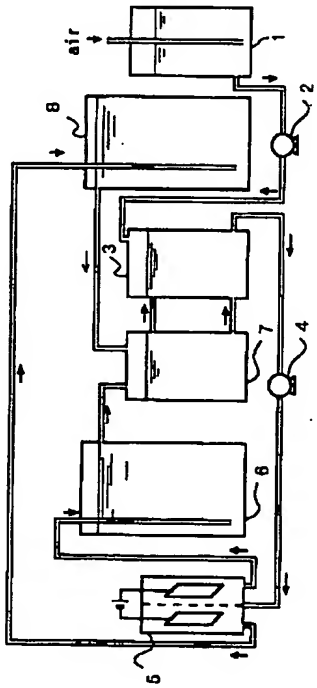
(54)【発明の名称】　育毛水、その製造方法、その製造装置、及び、テストステロン－５α－ヒドロゲナーゼ活性抑制剤

(57)【要約】
【課題】　短期間で効果的に髪の毛を発毛させ、育成する育毛水を提供する。
【解決手段】　酸化還元電位を１０００ｍＶ以上とした温泉水からなる育毛水。



【特許請求の範囲】
【請求項1】 酸化還元電位を１０００ｍＶ以上とした温泉水からなることを特徴とする育毛水。
【請求項2】 上記酸化還元電位の調整が循環陽極酸化法によることを特徴とする請求項１に記載の育毛水。
【請求項3】 蒸留水で２倍に希釈した５０ミリモルトリス塩酸緩衝液（ｐＨ７．５）を当容量添加し、常温でで４０分間放置したときの、混合前の酸化還元電位からの電位低下量が３５０ｍＶ超であることを特徴とする育毛水。
【請求項4】 温泉水を原料とし、陽極酸化によりその酸化還元電位を１０００ｍＶ以上とすることを特徴とする育毛水の製造方法。
【請求項5】 上記酸化還元電位の調整を循環陽極酸化法によって行うことを特徴とする請求項４に記載の育毛水の製造方法。
【請求項6】 陽極と陰極との間に隔膜を有する電解槽、陽極側処理水を蓄える陽極側処理水槽、陰極側処理水を蓄える陰極側処理水槽、及び、陽極側処理水槽からの処理水と陰極側処理水槽からの処理水とを混合する混合槽、及び混合槽から該電解槽へ処理水を移送する移送手段とを有することを特徴とする育毛水の製造装置。
【請求項7】 酸化還元電位を１０００ｍＶ以上とした温泉水からなることを特徴とするテストステロン－５α－ヒドロゲナーゼ活性抑制剤。
【請求項8】 蒸留水で２倍に希釈した５０ミリモルトリス塩酸緩衝液（ｐＨ７．５）を当容量添加し、常温で４０分間放置したときの、混合前の酸化還元電位からの電位低下量が３５０ｍＶ超であることを特徴とするテストステロン－５α－ヒドロゲナーゼ活性抑制剤。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、髪の毛を発毛させ、育成する技術に関する。
【０００２】
【従来の技術】古来より髪の毛は生命のシンボルであった。そして、現代社会においても、ふさふさとした髪の毛は若さの発現をイメージさせる。これに対し、脱毛症、いわゆるはげはコンプレックスの原因になりやすく、人格にまで大きな影響を及ぼすと云われている。
【０００３】しかしながら、脱毛症の治療は困難であり、現在までに科学的・俗信的を問わず数多くの方法が試みられてきたが、未だに決定的と云えるような解決方法は見出されていないのが現状である。
【０００４】
【発明が解決しようとする課題】本発明は、上記した従来の問題点を改善する、すなわち、短期間で、簡便に、かつ、効果的に髪の毛を発毛させ、育成する育毛水を提供することを目的とする。
【０００５】
【課題を解決するための手段】最近、脱毛症に関し、男性ホルモンであるテストステロンに注目し、この方面からの問題解決が取り組まれている。しかし、ホルモンのバランスを崩したり、あるいは、副作用を伴うなどの問題があり、実用化が困難であった。本発明者もこのテストステロン－５α－ヒドロゲナーゼの活性に注目し、この活性を抑制する方法について鋭意検討し、本発明に至った。
【０００６】すなわち、本発明の育毛水は上記課題を解決するため、請求項１に記載の通り、酸化還元電位を１０００ｍＶ以上とした温泉水からなる構成を有する。また、本発明の育毛水は上記課題を解決するため、請求項３に記載の通り、蒸留水で２倍に希釈した５０ミリモルトリス塩酸緩衝液（ｐＨ７．５）を当容量添加し、常温でで４０分間放置したときの、混合前の酸化還元電位からの電位低下量が３５０ｍＶ超である。
【０００７】
【発明の実施の形態】本発明で用いる原料としては、通常、温泉水であることが必要である。ここで、温泉水とは一般に温泉として指定されているものを用いることができる。
【０００８】温泉水としては、カルシウムや硫黄、アルミニウム、ケイ素、カリウム、ジルコニウム、鉄、及び塩素イオン、硫酸イオンなども含むものが望ましい。その他ナトリウム、マグネシウム、燐、ストロンチウム、臭素、マンガン等を含んでいるものであっても良い。なお、特に酸性の温泉水であることが望ましい。
【０００９】このような酸性の温泉水は例えば、蔵王温泉（高見屋２号）、鳴子温泉（陽泉１号温泉神社硫黄混合泉）、岳温泉（元湯）、須川温泉（滝の湯）、玉川温泉（大噴の湯）、草津温泉（湯畑）、別府温泉（地蔵泉）、登別温泉（１号乙泉）などが挙げられる。
【００１０】なお、酸性以外の温泉水、例えば、肘折温泉（組合２号）、岡谷温泉（長野県岡谷）、高峰温泉（長野県小県郡）、湯平温泉（大分県玖珠群）、浅草岳温泉（浅草岳温泉第２）、今神温泉、下呂温泉（温泉寺ポンプ所）などの温泉水では、所望の酸化還元電位を得ることが困難な場合があり、そのときは例えば上記の酸性の温泉水と混合使用することにより、好適に使用することができる。
【００１１】これら温泉水において溶存二酸化炭素を含んでいる場合には酸化還元電位を調整する際に障害となることがあるため、その調整前に窒素、あるいは空気などを吹き込むいわゆるバブリングを充分行ってから用いることが望ましい。
【００１２】ここで、詳細は不明であるが、本発明の育毛水の主原料である温泉水は多くの化合物やイオンを溶解しており、また、天然水ならではのクラスタサイズを有する。このような原料を用いて特定の酸化還元電位を有しているため、本発明の育毛水は、脱毛症の原因とな

るテストステロン－５α－ヒドロゲナーゼの活性を抑制し、その結果、本発明特有の画期的な効果が短期的に得られるものと推察されている。

【００１３】なお、本発明の育毛水において原料として温泉水そのものを用いてもよいが、電解に適した導電率に調整するため、蒸留水、イオン交換水などの各種イオンの少ない水、例えば日本薬局方の精製水、あるいは、水道水等を適宜添加しても良い。

【００１４】本発明における酸化還元電位は、白金電極と甘汞電極とを用いて標準水素電極電位に換算する方法など、一般的な方法で測定される値を用いる。なお、市販の酸化還元電位計などを用いて測定しても良い。

【００１５】なお、本発明の育毛水において酸化還元電位は１０００ｍＶ以上であることが必要である。１０００ｍＶ以下であると、充分な効果が得られない。なお、同時にｐＨが２．４以下で、残留塩素濃度と次亜塩素酸濃度の和が５ｐｐｍ以上となるときに特に優れた効果が得られる。

【００１６】また、本発明の育毛水は、蒸留水で２倍に希釈した５０ミリモルトリス塩酸緩衝液（ｐＨ７．５）を当容量添加し、常温でで４０分間放置したときの、混合前の酸化還元電位からの電位低下量（以下「４０分間での酸化還元電位の低下量」とも云う）が３５０ｍＶ超である。市販の強酸性水にも酸化還元電位が１０００ｍＶ以上のものもあるが、それらは全て、上記４０分間での酸化還元電位の低下量が３００ｍＶ以下であり、このような市販の強酸性水では本発明の効果は得られない。なお、４０分間での酸化還元電位の低下量と本願発明の効果との関係は例えば以下のようにも考えられる。

【００１７】すなわち、緩衝液中で速やかに酸化還元電位が低下する育毛水は、その減少する電位に相当する一種の活性化力を有している。そしてこの活性化力が頭部皮膚、毛根等の発毛・育毛を司る器官に働きかけ、発毛、育毛を促進させると考えられ、また、このときのエネルギーの上記器官への働きかけは短時間で集中的なものであることが必要であると推測される。このことは、酸化還元電位が高くても、４０分間での酸化還元電位の低下量が少ない市販の強酸性水では本発明の効果が得られないことからも裏付けられる

【００１８】本発明において酸化還元電位の調整は、電解槽を用いて行うことができる。すなわち、陽極と陰極、及び電解槽の構造上の必要に応じて隔膜を用いて電気分解を行うことによって行うことができる。なお、陽極及び陰極は充分な耐性を有する材質からなることが必要である。このような材質として白金をコーティングしたチタン等を挙げることができる。

【００１９】なお、本発明における酸化還元電位の調整は、循環陽極酸化法によることが望ましい。ここで循環陽極酸化法とは、電解槽の陽極側で処理された処理水（陽極側処理水）の全量と、陰極側で処理された処理水（陰極側処理水）の全量とを混合し、これを電解槽へ原水として供給し、電解処理を行い、これを繰り返す方法である。なお、陽極側処理水と陰極側処理水との混合比率としては特に指定はないが、通常１：１付近である。

【００２０】本発明の育毛水の使用にあたってはそのまま用いることが好ましい。不用意な希釈、あるいは、第三成分の添加により、本発明の効果が著しく減じたり、あるいは効果自体が得られなくなる場合がある。そのため、蒸留水、イオン交換水、水道水等による希釈、あるいは、他の育毛成分、調髪成分などのその他の成分と混合して用いる場合には、あらかじめ効果の低下がないことを確認することが必要である。

【００２１】本発明の育毛水はスプレー、塗布などの方法で必要な箇所に供給することにより、発毛・育毛を促進させることができる。このとき、１日に１回乃至数回、あるいは数日乃至１週間に１回などと、定期的に用いることが望ましい。なお、通常は１日２回の使用で、効果的かつ迅速に効果が発揮できる。すなわち、脱毛症となって１０年程度以内の箇所に関しては、２週間～２ヶ月の使用で増毛効果が客観的に確認できるようになる。また、脱毛症となって１０年程度以上経過した箇所も、３～６ヶ月程度の使用継続により順次発毛・育毛する。なお、白髪だった部分が徐々に黒髪に変わるなどの副次効果が得られる場合が多い。

【００２２】本発明の育毛水の使用により発毛・育毛した部分は、その後も育毛水の使用を続けることにより維持される。この場合の育毛水の使用量、使用頻度は、発毛・育毛時に比して適宜少なくしても良い。なお、上記育毛水は、紫外線を遮蔽する容器に入れ、冷暗所に保存することが望ましい。

【００２３】

【実施例】以下に本発明の育毛水について具体的に説明する。なお、本発明は以下の例に限定されるものではない。

【００２４】［製造装置］図１に本発明の育毛水を製造するための装置の実例を示すモデル図である。図１中符号１を付して示されているのは、曝気槽である。温泉水（原水）はこの曝気槽１で空気を吹き込まれ（約２８１／ｍｉｎ）、溶存二酸化炭素が除去される。曝気槽で不要な二酸化炭素が除去された原水はポンプ２によりポンプ槽３にその上部から移される。

【００２５】なお、本例では原水の導電率が９０００μＳ／ｃｍを超える場合に日本薬局方精製水を加え、９０００μＳ／ｃｍ以下としている。

【００２６】この水はポンプ槽３の下部からポンプ４により電解槽５に導入される。電解槽５には白金メッキが施されたチタンからなる陽極及び陰極があり、これら電極の間には隔膜が配されていて、陽極付近で電解処理された処理水（陽極側処理水）と、陰極付近で電解処理された処理水（陰極側処理水）との混合を防止している。

【００２７】陽極側処理水は電解槽５から陽極側処理水槽６下部へ導入されてこの陽極側処理水槽６を満たし、余剰の処理水は陽極側処理水槽６上部からさらに混合槽７へ導入される。一方、陰極側処理水は電解槽５から陰極側処理水槽８下部へ導入されてこの陽極側処理水槽６を満たし、余剰の処理水は陰極側処理水槽８上部からさらに混合槽７へ導入される。なお、製品としての処理水は陽極側処理水槽６下部から採取する。

【００２８】これら陽極側処理水及び陰極側処理水とは混合層で混合されたのち、その上部及び下部からポンプ槽３を経て再度電解槽５へとポンプ移送されて再度電解処理が行われて、循環使用される。

【００２９】なお、本例においてはポンプ槽３及び混合槽７のそれぞれ容量は同じ（１０１）であって、陽極側処理水槽６及び陰極側処理水槽８のそれぞれの容量（２０１）の半分であり、また曝気槽１の容量は４０１である。なお、電解槽５は非常にコンパクトであり、電解槽５の容量、各流路及びポンプ内の容量は上記各容器に比べ充分小さい。

【００３０】また、この装置を実際に運転すると陰極側処理水槽８底部に沈殿物が蓄積することがあったが、この水槽から混合槽への処理水の移送は水槽上部から行われるため、沈殿物による障害は何ら発生しない。

【００３１】［循環陽極酸化処理］以下に示す実施例では図１のような循環陽極酸化処理装置を本発明に係る育毛水の製造装置として用いた。なお、原水（温泉水）は室温になったものを用い、また、以下の処理はすべて室温で行った。

【００３２】ポンプ４の流量を３１／ｍｉｎに設定した。この流量は装置の循環部分の容量のほぼ１／２０であり、２０分間の処理で循環部分の水は１サイクルの電解処理が行われたと計算できる。

【００３３】電解槽の電極間に印加する電圧は通常４Ｖ以上３０Ｖ以下の範囲であり、通常、上記による電解処理換算で６サイクル程度の処理により酸化還元電位が１０００ｍＶ以上になるように設定する。

【００３４】［処理水Ａの作製］秋田県田沢湖町玉川温泉大噴の湯（含弗素砒素硼酸酸性明ばん緑ばん泉）を原水として、３０分間の空気による曝気処理を行った後、循環陽極酸化処理を行った。得られた製品としての処理水（以下「処理水Ａ」）の酸化還元電位は１１８０ｍＶで、ｐＨは１．８０、次亜塩素酸イオン濃度と次亜塩素酸濃度の和が５４ｐｐｍとなった。　この処理水Ａの４０分間での酸化還元電位の低下量は３５９ｍＶであった。

【００３５】［処理水Ｂの作製］蔵王温泉源七露天の湯（山形県山形市蔵王温泉字荒敷８６２番１、酸性・含硫黄－アルミニウム－硫酸塩・塩化物温泉（旧泉質名：含硫化水素強酸性明ばん泉））を用い、処理水Ａと同様にして処理水Ｂを得た。このものの酸化還元電位は１１４０ｍＶで、ｐＨは２．１、次亜塩素酸イオン濃度と次亜塩素酸濃度の和は３０ｐｐｍとなった。また、処理水Ｂの４０分間での酸化還元電位の低下量は３４２ｍＶであった。

【００３６】［処理水Ｃの作製］蔵王温泉の源泉水（高見屋２号、酸性・含鉄－硫黄－アルミニウム－硫酸塩泉）を用い、処理水Ａと同様にして処理水Ｃを得た。このものの酸化還元電位は１２０５ｍＶで、ｐＨは１．６８、次亜塩素酸イオン濃度と次亜塩素酸濃度の和は５４ｐｐｍとなった。また、処理水Ｃの４０分間での酸化還元電位の低下量は３９４ｍＶであった。

【００３７】［処理水Ｄの作製］草津温泉の源泉水（大滝の湯、酸性硫黄泉）を用い、処理水Ａと同様にして処理水Ｃを得た。このものの酸化還元電位は１１１５ｍＶで、ｐＨは２．４、次亜塩素酸イオン濃度と次亜塩素酸濃度との和は２１ｐｐｍとなった。また、処理水Ｄの４０分間での酸化還元電位の低下量は３４１ｍＶであった。

【００３８】［テストステロン－５α－ヒドロゲナーゼ活性への影響調査　その１］テストステロン（以下「ＴＳ」とも云う）は組織中のテストステロン－５α－ヒドロゲナーゼ（テストステロン－５α－リダクターゼ、以下「Ｔ５αＨ」とも云う）により５α－ジヒドロテストステロン（以下「５αＤＨＴ」とも云う）に還元される。

【００３９】以下の検討ではヒト肝サイトゾル（株式会社ケー・エー・シーより入手、－８０℃保存品）及びラット前立腺（ＳＤ系雄性ラット（７週齢、日本チャールス・リバー株式会社より入手）の前立腺を調整直後に使用）を酵素材料としてＴ５αＨ活性に及ぼす処理水Ａ～Ｃの影響を調べた。試験項目を表１に示す

【００４０】

【表１】

試験項目	被検物質	基質	酵素材料	試料数
阻害試験	処理水Ａ、処理水Ｂ及び処理水Ｃ（３種、各１濃度）（陰性対象）	^{14}Ｃ－ＴＳ（１濃度）	ヒト肝サイトゾル及びラット前立腺（２種）	２４

【００４１】用いた試薬としては、［４－^{14}Ｃ］テストステロン（American Radiolabled

Ｃｈｅｍｉｃａｌｓ　Ｉｎｃ社製、比放射能２．１２ＧＢｑ／ｍｍｏｌ、放射科学的純度９８．７％）及びβ－ニコチンアミドアデニンヌクレオチド還元型（以下「ＮＡＤＨ」とも云う、オリエンタル酵母工業製）を、いずれも－２０℃で保存したものを、また、その他の試薬は特級試薬を用いた。

【００４２】阻害試験は次のように行った。５０ミリモルトリス塩酸緩衝液（ｐＨ７．５、最終濃度５０ｍｍｏｌ／ｌ）で調整したヒト肝サイトゾル（最終濃度５ｍｇｐｒｏｔｅｉｎ／ｍｌ）、またはラット前立腺ホモジネート（氷冷下で同量の緩衝液を加えてミクロホモジナイザーにより調整、最終濃度２５０ｍｇ／ｍｌ）にＮＡＤＨ（最終濃度１ｍｍｏｌ／ｌ）、［４－^{14}Ｃ］ＴＳ（最終濃度２μｍｏｌ／ｌ）及び蒸留水（陰性対照）または処理水Ａ～Ｃのいずれか（最終２倍希釈）を加えて３７℃でインキュベーション（ヒト肝サイトゾル：１２０分、ラット前立腺ホモジネート：３０分）した後、２倍容量の氷冷エタノールを加えて反応を停止させた。

【００４３】上清をＴＬＣプレート（Ｓｉｌｉｃａ　ｇｅｌ　６０　F_{254}　Ｍｅｒｃｋ社製を使用）にスポットしてジクロロメタン／アセトン（４：１）により展開した後、ＴＬＣプレート上の放射能分布をバイオイメージングアナライザー（富士写真フィルム製）により定量した。

【００４４】このとき代謝初速度は、基質の減少率（K_{met}）に初期基質濃度を乗じて、サイトゾルタンパク質または組織重量当たりの値で示し、また、被験溶液による阻害の有無は、各初速度を陰性対照の初速度と比較し、ｔ検定による判定した。（式Ｉ～ＩＩＩ参照）。ただし、これら式中Ｃｏは初期基質濃度、Ｃｔはｔ分後の基質濃度、ｔは反応時間（ｍｉｎ）をそれぞれ示す。

【００４５】

【数１】

$$\text{基質の減少率}(K_{met}) = (\ln(Co/Ct))/t \quad \cdots\cdots (I)$$

【００４６】

【数２】

$$\text{代謝初速度} = K_{met} \times Co / (\text{タンパク質または組織濃度}) \quad \cdots\cdots (II)$$

【００４７】

【数３】

$$\text{阻害率}(\%) = (\text{代謝初速度(対照)} - \text{代謝初速度(被験溶液)}) / \text{代謝初速度(対照)} \times 100 \quad \cdots\cdots (III)$$

【００４８】これら試験の結果、得られたヒト肝臓及びラット前立腺のＴ５αＨ活性に及ぼす処理水Ａ～Ｃの影響をそれぞれ表２及び表３に示し、またＴＬＣオートラジオルミオグラフの１例を図２に示す。

【００４９】

【表２】

被験溶液	希釈率（倍）	初速度（pmol / mg protein / min）		有意差（p）	阻害率（%）
			Mean ± S.D.		
陰性対照（蒸留水）	－	0.23 0.24 0.28	0.25 ± 0.03	－	－
処理水Ａ（pH 1.80）	2	0.09 0.04 0.07	0.07 ± 0.03	0.01	72.0
処理水Ｂ（pH 1.84）	2	0.08 0.12 0.11	0.10 ± 0.02	0.01	60.0
処理水Ｃ（pH 1.68）	2	0.03 0.02 0.02	0.02 ± 0.01	0.01	92.0

【００５０】

【表３】

被験溶液	希釈率 (倍)	初速度 (pmol / g tissue / min)		有意差 (p)	阻害率 (%)
			Mean ± S.D.		
陰性対照 (蒸留水)	−	43.20 46.16 49.20	46.19 ± 3.00	−	−
処理水A (pH 1.80)	2	24.40 22.80 24.40	23.87 ± 0.92	0.01	48.3
処理水B (pH 1.84)	2	29.52 31.44 34.56	31.84 ± 2.54	0.01	31.1
処理水C (pH 1.68)	2	2.00 2.24 0.24	1.49 ± 1.09	0.01	96.8

【００５１】これらより処理水Ａ、Ｂ及びＣはヒト肝臓のＴ５αＨ活性をそれぞれ７２％、６０％及び９２％阻害し、ラット前立腺のＴ５αＨ活性をそれぞれ４８％、３１％及び９７％阻害したことが判る。

【００５２】［テストステロン－５α－ヒドロゲナーゼ活性への影響調査　その２］それぞれ処理水Ａ、ＢおよびＣと同様にして処理水ＨＳＳＡＷ－１（酸化還元電位は１２０５ｍＶ、４０分間での酸化還元電位の低下量は３９４ｍＶ、ｐＨ：１．４１）、ＨＳＳＡＷ－２（酸化還元電位は１１８２ｍＶ、４０分間での酸化還元電位の低下量は３５９ｍＶ、ｐＨ：１．１４）及びＨＳＳＡＷ－３（酸化還元電位は１１９４ｍＶ、４０分間での酸化還元電位の低下量は３８５ｍＶ、ｐＨ：１．２６）を得た。

【００５３】これら処理水の他、蔵王温泉（高見屋２号）を使用し、図１に示した装置を用い、ただし、循環を行わず電解槽を１回通過させる電解処理を行い陽極側処理水を得た（以下、「通常電解水」と云う）。このものの酸化還元電位は１１０９ｍＶ、４０分間での酸化還元電位の低下量は３１８ｍＶ、ｐＨは１．６５であった。

【００５４】さらに、これら電解水の他、秋田県田沢湖町玉川温泉大噴の湯の温泉水（「温泉原水」と云う。酸化還元電位は４４６ｍＶ、４０分間での酸化還元電位の低下量は９ｍＶ、ｐＨ１．１４）、さらに市販の強酸性水（商品名「サンクエスト」。温泉水を原料として使用していないもの、酸化還元電位は１１４６ｍＶ、４０分間での酸化還元電位の低下量は２９０ｍＶ、ｐＨ２．９６）、塩酸溶液（蒸留水に塩酸を加えｐＨを１．８９に調製したもの）及び蒸留水（「陰性対照」と云う。ｐＨ５．６３）を用いて上記同様にラット前立腺のＴ５αＨ活性の阻害率を調べた。結果を表３に、ＴＬＣオートラジオルミオグラフの１例を図３に示す。

【００５５】

【表４】

被検検体	希釈率（蒸留水による）	阻害率（％）
陰性対照	−	−
ＨＳＳＡＷ－１	２	９５．２
ＨＳＳＡＷ－２	２	９０．３
ＨＳＳＡＷ－３	２	９３．６
通常電解水	２	４８．５
温泉原水	２	８０．８
塩酸溶液	２	７７．６
市販強酸性水	２	５１．１

【００５６】上記結果より、蒸留水で２倍に希釈した５０ミリモルトリス塩酸緩衝液（ｐＨ７．５）を当容量添加し、常温でで４０分間放置したときの、混合前の酸化還元電位からの電位低下量が３５０ｍＶ超である本発明の育毛水のテストステロン－５α－ヒドロゲナーゼ活性抑制効果は、温泉原水やｐＨを同程度に調製した塩酸溶

液、あるいは市販強酸性水より、高いものであることが判る。

【0057】なお、表4での本発明の育毛水のテストステロン－5α－ヒドロゲナーゼ活性抑制効果は表3での結果より高い値を示しているが、これは前者では育毛水作製後室温で比較的長期間保存したものを供試体として用いたのに対し、後者では育毛水作製後冷暗所に短期間保管し、その後速やかに用いたことによる違いであると推測される。

【0058】［発毛・育毛効果の検討：実施例、その1］上記検討により本発明に係る育毛水のテストステロン－5α－ヒドロゲナーゼ活性抑制効果は確認されたが、実際の発毛・育毛効果について調べた。

【0059】上記で作成した処理水A～Dを、脱毛症に悩む被験者に使用した。それぞれ朝晩の1日2回、脱毛部に約40m1をスプレーして試験を行った。いかにその結果を示す。

【0060】（被験者α：47歳、男性）使用前：頭頂付近に直径10cm程度の円形の薄毛部があり、地肌が殆ど透けて見える状態であった。この部分には1cm程度の短くまた細い毛髪が生えている程度であり、また、額は三日月型にはげていた。

【0061】97年6月6日より処理水Aの使用を開始したところ、2週間後に全体的に黒くなって地肌が見えにくくなったと云う印象が出てきて、また、髪の毛全体に「はり」を感じるようになった。1ヶ月後には薄毛部の髪の毛が明らかに太くなり、弾力を有するようになり、さらに、この部分の毛の長さも1．5cm超となった。さらに額上部の脱毛部と有毛部との境界に5mm程度の小さな毛が多数生えているのが確認された。使用開始から50日後には、家族にも「毛が生えてきたね」と云われるようになった。

【0062】なお、使用開始前に頭頂付近の薄毛部をファイバースコープ（拡大鏡）で観察した際には1つの毛穴のように見える箇所からそれぞれ1本の髪の毛が生えているように観察されたが、50日後に再度観察を行ったところ、殆どの毛穴から2本、場合によっては3本の毛が生えているように確認された。

【0063】被験者αは上記の50日間の使用でも、何らの障害（かゆみ、発疹等）も生じていず、本人の希望でさらに長期の試験を行うこととなった。

【0064】（被験者β：41歳、男性）使用前：頭部全体の髪の毛が薄く、そのため地肌を見えにくくするためにいわゆるパーマをかけていた。しかし、数年来、その効果も少なくなり、地肌が見えるようになっている。

【0065】97年5月10日より処理水Bの使用を開始した。1ヶ月後には額の方から髪を地肌に沿って指でかき分けて行くと、従来はなかったような短い髪の毛の存在を感じるようになった。なお、被験者βの頭の前の方にあざがあるが、この頃、行きつけの床屋で「あざが見えにくくなりましたね」と云われた。

【0066】なお、被験者βにおいてもファイバースコープ観察により、発毛（増毛）が確認されて、また、何らの障害も生じていない。

【0067】（被験者γ：53歳、男性）使用前：32歳位から頭の頂部が薄くなり、45歳を過ぎる頃には殆ど毛がなくなって、産毛のような細く短い毛がわずかに残っている状態であり、このことはファイバースコープでも確認された。なお、入手可能な育毛剤を数多く試してきたが、そのいずれでも自覚できるような効果は得られなかった。

【0068】97年6月15日より本発明に係る育毛水である処理水Cの使用を開始した。朝晩スプレーを行ったところ、1週間後に、薄毛部の産毛に存在感が出てきて、「こし」が感じられるようになった。その後使用を継続するにつれ、その産毛が徐々に黒くなり、また「密集感」が感じられるようになった。使用開始の2ヶ月後には「30歳代後半の頃に戻ったね」と家人に云われるようになった。なお、使用による不快感、違和感は全くなく、さらに長期の使用を希望している。

【0069】（被験者δ：47歳、女性）使用前：30代後半から頭頂部が薄くなり、42歳頃から地肌が見えるようになっていた。冗談に紛らわせてではあったが、家族からも「部分かつら」の使用を勧められるほどであった。なお、本発明に係る処理水の使用開始前に、美容院でファイバースコープによる50倍での観察を行ったところ、頭頂部では毛穴のように見える箇所から毛がそれぞれ1本づつしか生えていないことが確認された。

【0070】97年3月12日より処理水Cの使用を開始し、朝晩スプレーした。2ヶ月後には頭頂部での地肌の見え方が少なくなったと自覚できるようになった。上記と同じ美容院で頭頂部の拡大観察を行ったところ、毛穴のように見える箇所のほとんどに2本の毛が生えており、また、まれではあるが3本生えている箇所もあった。

【0071】使用開始後3ヶ月には、家族にも「ほう」と感心されるほど毛が増えてきて、将来的には20歳代の頃の状態に戻るのも夢ではないと期待しながら、使用を継続している。なお、かゆみや違和感等の不快な症状はまったく生じていない。

【0072】（被験者ε：27歳、男性）使用前：父は髪の毛が薄いものの、自分自身の髪の毛には全く不安を抱いていなかった。ところが25歳の秋、洗髪の際に浴室の排水溝の目皿が見えなくなるほどの抜け毛があり、自失してしまった。さらに、同じ頃、起床の度に枕が髪の毛で真っ黒になったかと錯覚を覚えるほど抜け毛があった。

【0073】本来不安を覚えるような年齢ではないはずであるにも拘わらず、市販の育毛剤を手当たり次第に試したが一向に改善されず、抜け毛はさらに進行し、会う

友人ごとに指摘され、からかわれるようになっていた。
【００７４】１９９７年１０月１６日より育毛水である処理水Ｄの使用を開始した。それまで洗髪時に目皿を覆い隠す量であった抜け毛が、使用開始１７日目にほとんどなくなった。当初は処理水の効果とは信じられず、抜け毛が多い季節が終わったためと考えていた。
【００７５】同時期に、理容室でファイバースコープによる拡大観察を行ったところ、髪の毛が薄い部分の毛穴のように見える箇所にそれぞれ黒い太い１本の毛が生えているのが観察されたが、その脇に小さな産毛が生えていることが確認された。
【００７６】さらに１か月使用を継続した後、再度ファイバースコープによる拡大観察を行った。すると前述の毛穴のように見える箇所からそれぞれ太い・黒い毛が２本ずつ、場所によっては3本ずつ生えているのが確認された。なお、このころから、髪の毛が薄いことを指摘されることがなくなった。これを励みとして、処理水Ｄの使用を継続し、１２月頃には「髪の毛が薄い」と云うのは他人事のように思えるようになった。
【００７７】そこで、この頃から処理水Ｄの使用量を一日１５ｍｌ程度に、また使用回数も１日１回（夜のみ）とし、その後、１９９８年９月下旬に至っている。なお、一般に秋は抜け毛が多いシーズンにも拘わらず、特に抜け毛が多くなることもなく、さらに日常生活において髪の毛についての精神的な重荷や劣等感を感じることが全くなくなった。なお、この処理水Ｄが原因と思われるような自覚症状、不都合等は使用開始後から１９９８年９月下旬に至るまで一度もない。
【００７８】（被験者ζ：３６歳、男性）使用前：若い頃から、俗に「猫毛」と云われる毛であり、頭の毛の薄いのは気にかけてもいなかった。しかし、ある日、娘（６歳）に「お父さん、どうしてそんなに髪の毛が薄いの」と問われ、急に気になるようになった。
【００７９】１９９８年4月１５日より処理水Ｄの使用を開始し、１週間後には抜け毛が減ったことに気づいた。使用開始４０日後にはボリューム感が出てきて、髪の毛が「ファー」と持ち上がっているような感触を覚えた。４か月後には妻にも感心されるほどになり、娘にも喜んで貰えた。
【００８０】［育毛・発毛効果の検討：比較例］
【００８１】［処理水Ｅの作製］処理水Ａと同様に、ただし、循環陽極酸化処理のサイクル数を少なくして、酸化還元電位は９２０ｍＶで、ｐＨは２．１、次亜塩素酸イオン濃度と次亜塩素酸濃度の和が２１ｐｐｍとなった処理水Ｅを得た。この処理水Ｆの４０分間での酸化還元電位の低下量は３１９ｍＶであった。
【００８２】また、温泉水の代わりに川越市水道水に若干の食塩を添加し、これに電解処理を施し、陽極側処理水を得た（処理水Ｆ）。このものの酸化還元電位は１０８０ｍＶで、ｐＨは２．９、次亜塩素酸イオン濃度と次亜塩素酸濃度の和は１５ｐｐｍであった。この処理水Ｆの４０分間での酸化還元電位の低下量は２８０ｍＶであった。
【００８３】さらに温泉水の代わりに川越市水道水をそのまま用いて、それ以外は処理水Ａと同様に循環陽極酸化処理を行い処理水Ｇを得た。このときの酸化還元電位は１１３０ｍＶであった。この処理水Ｇの４０分間での酸化還元電位の低下量は２６０ｍＶであった。
【００８４】これら処理水Ｅ～Ｇを用いて処理水Ａ～Ｄと同様に、髪の毛が少なくなった男女（４０歳代～５０歳代）それぞれ数名ずつモニターテストを行った。しかし、いずれの場合も試験開始３月後の段階でも、客観的あるいは主観的に認められるような発毛・育毛効果は得られなかった。
【００８５】さらに、市販の強酸性水（温泉水を原料として使用していないもの、酸化還元電位は１１４６ｍＶ、４０分間での酸化還元電位の低下量は２９０ｍＶ、ｐＨ２．９６）についても同様にモニターテストを行ったが、試験開始３月後の段階でも、客観的あるいは主観的に認められるような発毛・育毛効果は得られなかった。
【００８６】［発毛・育毛効果の検討：実施例、その２］上記とは別の被験者６３名（いずれも、薄毛を自認し、改善を望んでいる人。男性５６名、女性７名）が、処理水Ｂと同様にして作製した処理水Ｂ’を６か月連続して使用した際の改善度について調べた。
【００８７】その結果、使用開始前には、短い毛しか生えなかった箇所の髪の毛が伸びてきた、髪の毛のなかった箇所に新毛が見られるようになった、薄かった部分の髪の毛が増えてきた等の大幅な改善を実感した被験者は３１人、髪の毛にハリ・コシなどを感じた、髪の毛が太くなってきた、抜け毛の量が少なくなってきた等の何らかの改善を実感した被験者は２０人、変化が感じられないと回答した被験者は１２人であった。
【００８８】このうち、変化が感じられないと回答した被験者についてファイバースコープによる頭部拡大写真を撮影し、処理水Ｂ’使用開始前の同様の写真と比較したところ、これら１２人中６人に髪の毛が太くなる、密度が高くなるなどの改善が見られた。
【００８９】
【発明の効果】本発明の育毛水は、極めて短期間に優れた発毛・育毛効果が発現する、まさに福音とも云うべき優れた育毛水である。すなわち、数週間～１箇月の短期間で効果が実感できるため、さらなる発毛・育毛への希望と励ましが得られ、その結果、最終的に確実な発毛・育毛が可能となる育毛水である。
【図面の簡単な説明】
【図１】本発明の育毛水を製造するための装置の実例を示すモデル図である。
【図２】本発明の育毛水のテストステロン－５α－ヒド

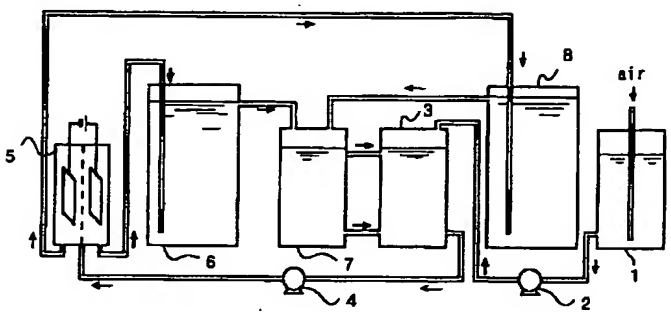
ロゲナーゼ活性抑制効果を示すＴＬＣオートラジオルミオグラフの例である。

【図３】本発明の育毛水のテストステロン－５α－ヒドロゲナーゼ活性抑制効果を示すＴＬＣオートラジオルミオグラフの他の例である。

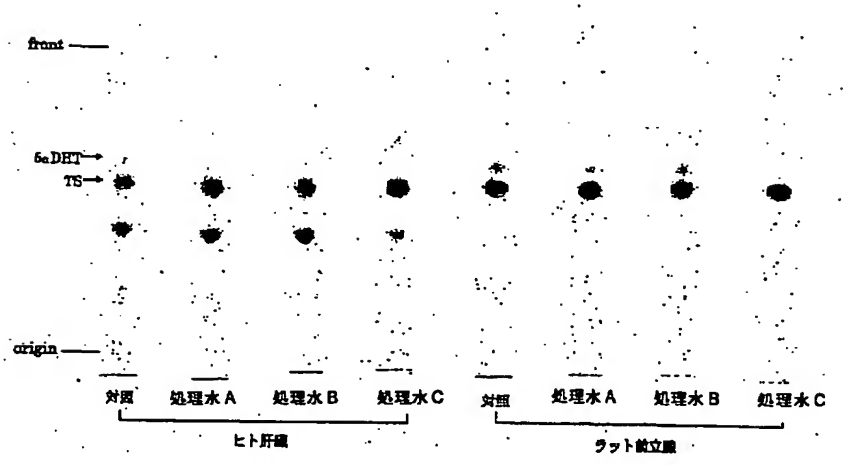
【符号の説明】

1　曝気槽
2　ポンプ
3　ポンプ槽
4　ポンプ
5　電解槽
6　陽極側処理水槽
7　混合槽
8　陰極側処理水槽

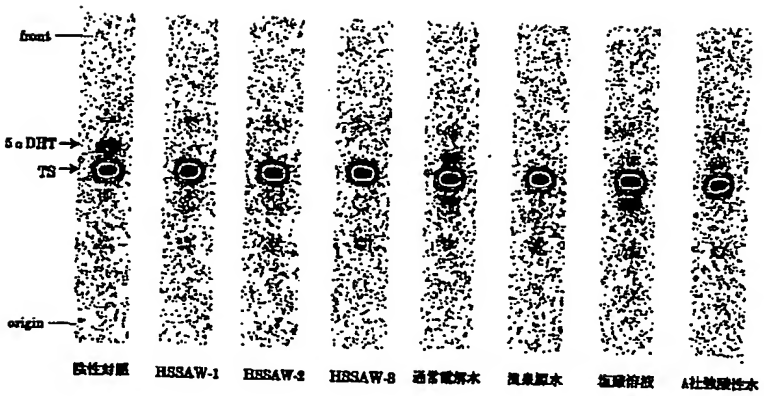
【図1】



【図2】



【図3】



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